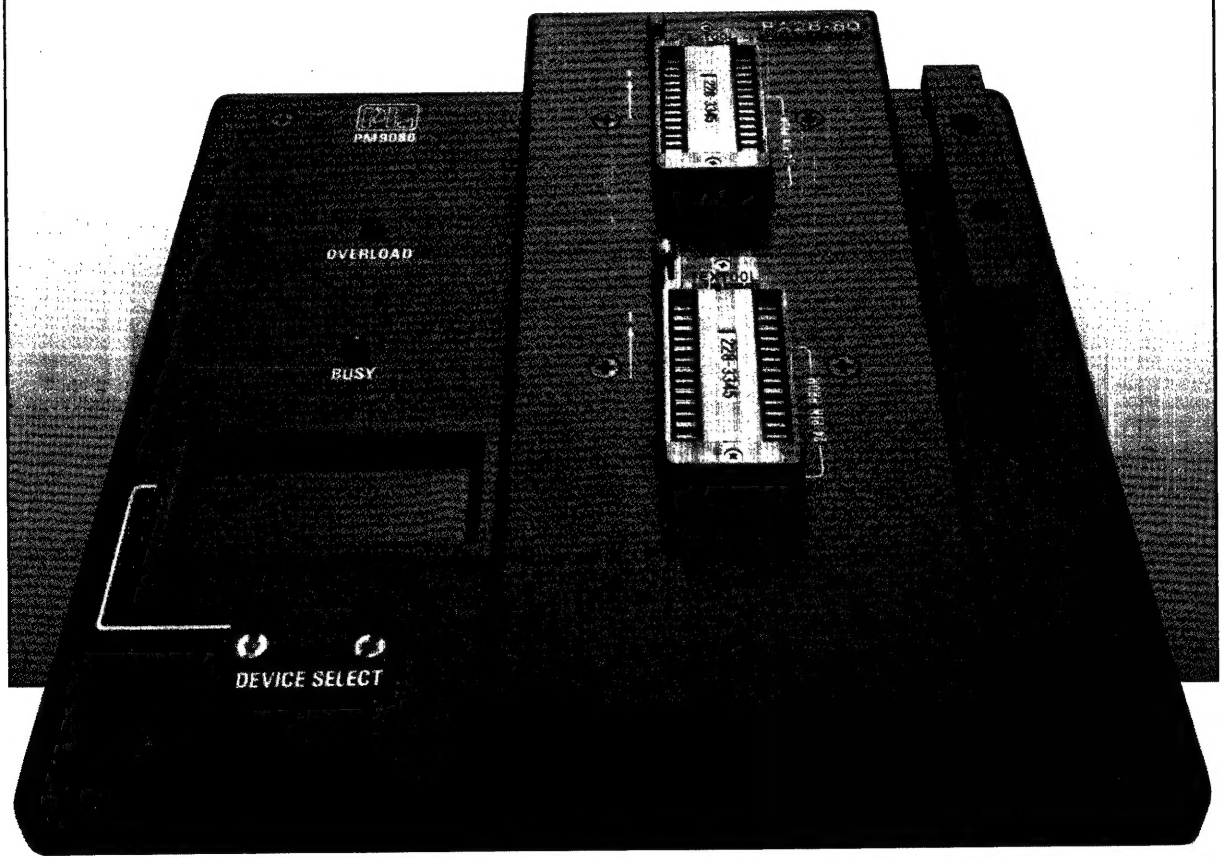
# PM9080
# Personality Module

# USER'S MANUAL

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# PM9080
# Personality Module

6/82

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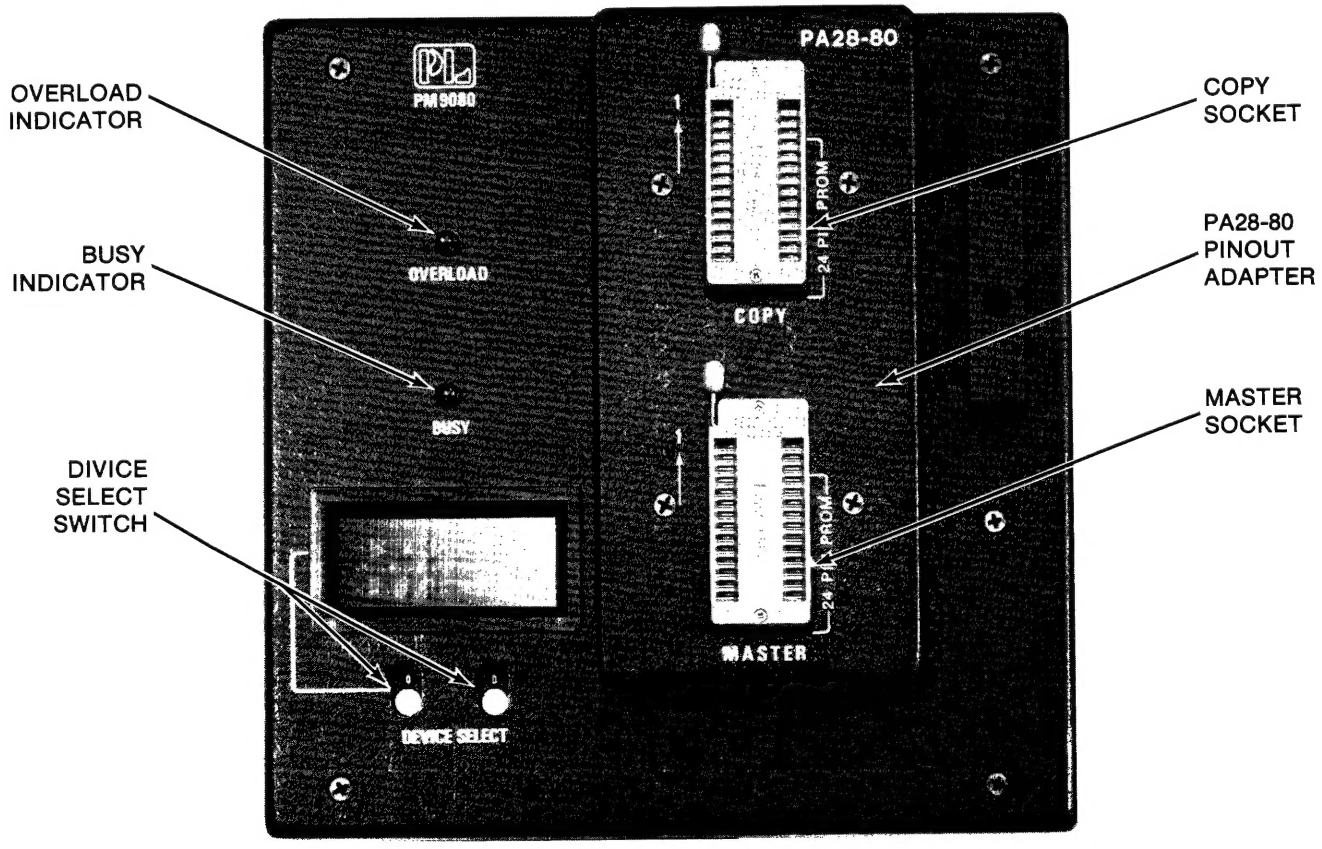
# SECTION 1
# General Description

## SUMMARY

The PM9080 is a Generic personality module for 5-volt MOS PROMs. It is designed to operate with the series M980 and M910A PROM Programmer control units. The PM9080 with a 28-pin Pinout Adapter can program both 24 and 28-pin devices. Pinout Adapters are available for programming microprocessor and peripheral devices with onboard EPROM. The PM9080 can be configured to program 5-volt MOS devices through onboard switch selection. The device type to be programmed is indicated in an eight-digit alphanumeric display. The PM9080 is capable of programming all popular 5-volt NMOS, CMOS, and HMOS EPROMs and E$^2$PROMs. See *Device Selection Guide* for a list of devices that are currently supported.

## FEATURES

- Switch-selectable device programming.
- Cold Sockets.
- Separate MASTER and COPY sockets permit direct duplication and protect the Master device.
- Post-programming High and Low Vcc device test.
- Built-in Field Assurance Confidence Test (FACT) and diagnostics.
- Overload detection circuits and LED indicator.
- Upside-down device detection to protect the devices.
- Capable of supporting Electronic Signature devices.
- Field upgradable software to accommodate additional or revised programming algorithms.
- Optional remote field upgradable capabilities.




PM9080 with PA28-80

**Switch-Selectable Device Programming:** Two switches are used to configure the PM9080 to support a particular device. An eight-digit ASCII display will indicate the device selected and can show two messages by alternating between messages every 1.5 seconds. (See Device Selection Guide on page A-1).

**Cold Sockets:** Vcc is never applied to the MASTER or COPY sockets until the function selected is initiated. Vcc is removed immediately after the selected function is completed. This is done to help prevent damage to devices from insertion or removal from hot (Vcc applied) sockets.

**MASTER/COPY Sockets:** These sockets are activated by a handle located adjacent to Pin 1 of the socket. When the handle is raised or in the up position the contacts are open, and the device may be inserted. Lowering the handle engages the contacts and locks the device in place. The MASTER socket is a read-only socket to protect the master device from being accidentally programmed. (See Appendix A for further details).

**High and Low Vcc Compare:** Following the programming of each address in the copy device, Vcc is raised to the high limit of 5.20 V. The data in this address is read and compared to the data source. Vcc is then lowered to the low limit of 4.80V and the data is read and compared again. These tests are performed to detect faulty devices.

**FACT (Field Assurance Confidence Test):** Firmware is included which will allow various voltage levels and dynamic programming waveforms to be applied to the COPY socket. The tests available for each programming algorithm are: a. Vcc HIGH, LOW, and NOMINAL (COPY socket only); b. Vpp HIGH, LOW, and 0 volts (COPY socket only); c. Address Lines; d. Dynamic Vpp programming waveform test (COPY socket only); e. Short Detection Test which tests for Vcc overload and shorted address and data lines.

**Short Detection Tests:** At all times Vcc for the MASTER and COPY sockets is hardware monitored for shorts. During any program sequence, Vpp on the COPY socket is monitored for a short. If Vcc or Vpp has a short, or is drawing exessive current, the PM9080 will illuminate the OVERLOAD indicator and the Control Unit will indicate an error.

When entering the PROGRAM or DUPLICATE mode, the PM9080 automatically implements a test to check for PM address and data lines. If a shorted address or data line is found, a failure is indicated on the control unit and the operation will not be initiated. If all tests pass successfully, the mode that was selected will continue normally. This test will normally detect any device which was inserted into the COPY or MASTER socket upside down.

**Electronic Signature Capability:** To allow for Electronic Signature, address line A9 has the capability of being set high to either TTL $V_{IH}$ level or 11.75V. When the device selected is an Electronic Signature part, address line A9 is set to 11.75V by software. The signature (an eight-bit byte) is then read from the device. The correct programming algorithm is determined automatically by the PM9080 using a lookup table. The PM9080 display will indicate the device for which it is configured to program.

**Field Upgradable Software:** Since programming algorithms are software based, updating the PM9080 when new PROMs are developed is a simple and easy project. The software which controls programming algorithms is located in PROMs (2732 or 2764) that are readily accessible in the PM9080. When you want to program MOS devices introduced after you've purchased your PM9080, simply order the latest set of PROMs for do-it-yourself installation.

**Optional Remote Field Update of Software:** This feature allows remote on-board programming of the PM9080 control PROMs by customers who have a number of programmers in the field. Updating involves adding new device programming algorithms or changing existing algorithms in the software contained in the PM9080. For further information contact Pro-Log.

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**NOTE**

**M980 Control Units built prior to April 1982 require a software update to work with the PM9080.**

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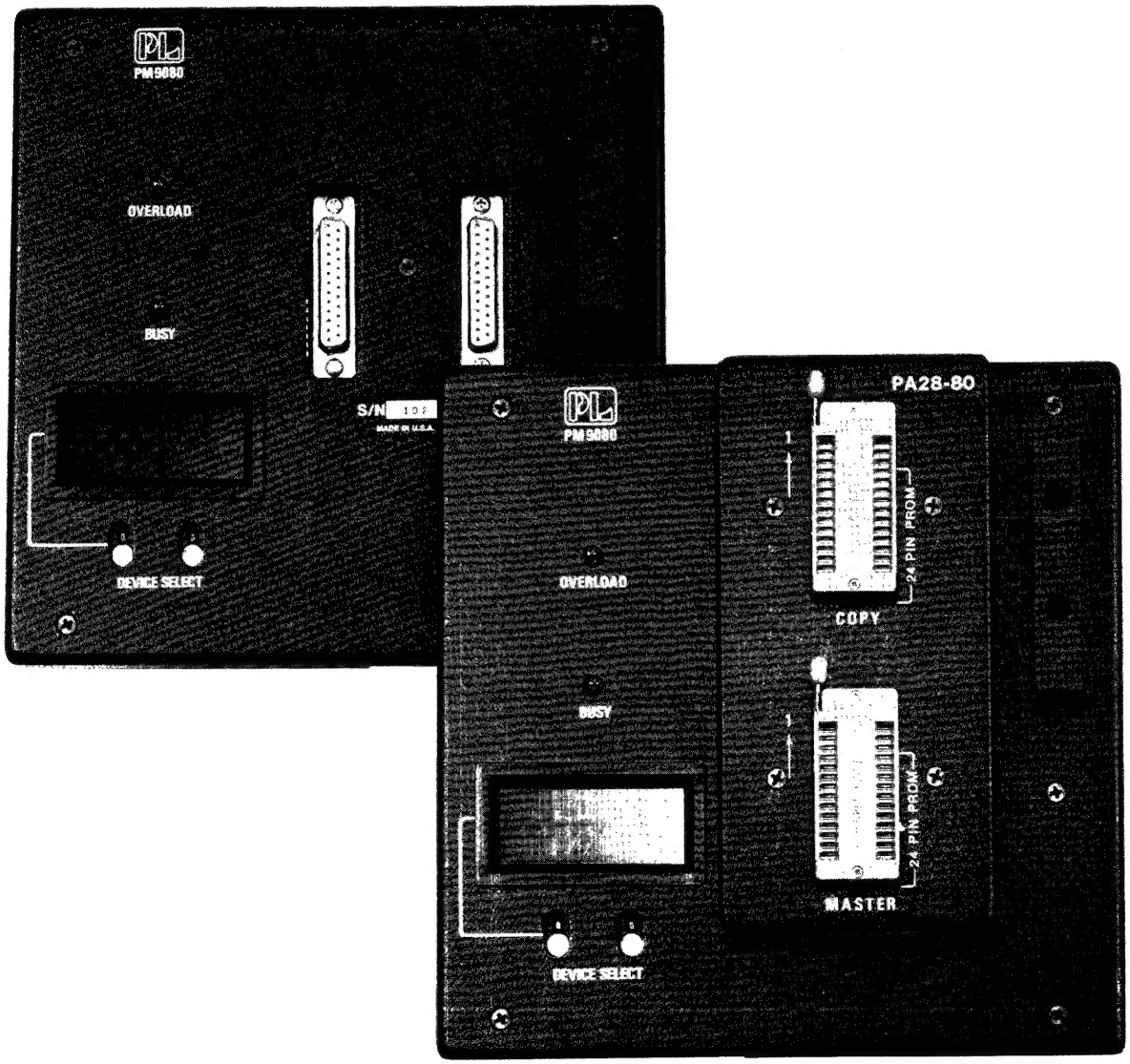
# SECTION 2
# Introduction

## FRONT PANEL DESCRIPTION

**MASTER Socket:** This socket, located on the plug-in Pinout Adapter, accepts previously programmed devices that are to be Duplicated or Compared, Blank Checked, Checksummed, or Read. The programming voltage, Vpp, is not connected to the MASTER socket, so it is impossible to accidentally alter the Master device. A zero insertion force (ZIF) socket is used for ease of device insertion and removal.

**COPY Socket:** This socket accepts the device to be Programmed, Duplicated or Compared, Checksummed, Blank Checked, or Read. After RESET or when the selected function is finished, Vcc is reduced to less than 0.6V. This "cold socket" condition is necessary to prevent damage to some devices. A zero insertion force (ZIF) socket is used for ease of device insertion and removal.




PM9080 with PA28-80 Installed

**BUSY LED**: This indicator is illuminated whenever Vpp is applied to the COPY socket. It is illuminated continuously during the duplication operation. **Warning**: Devices should not be inserted or removed when the BUSY LED is illuminated as this may damage some devices.

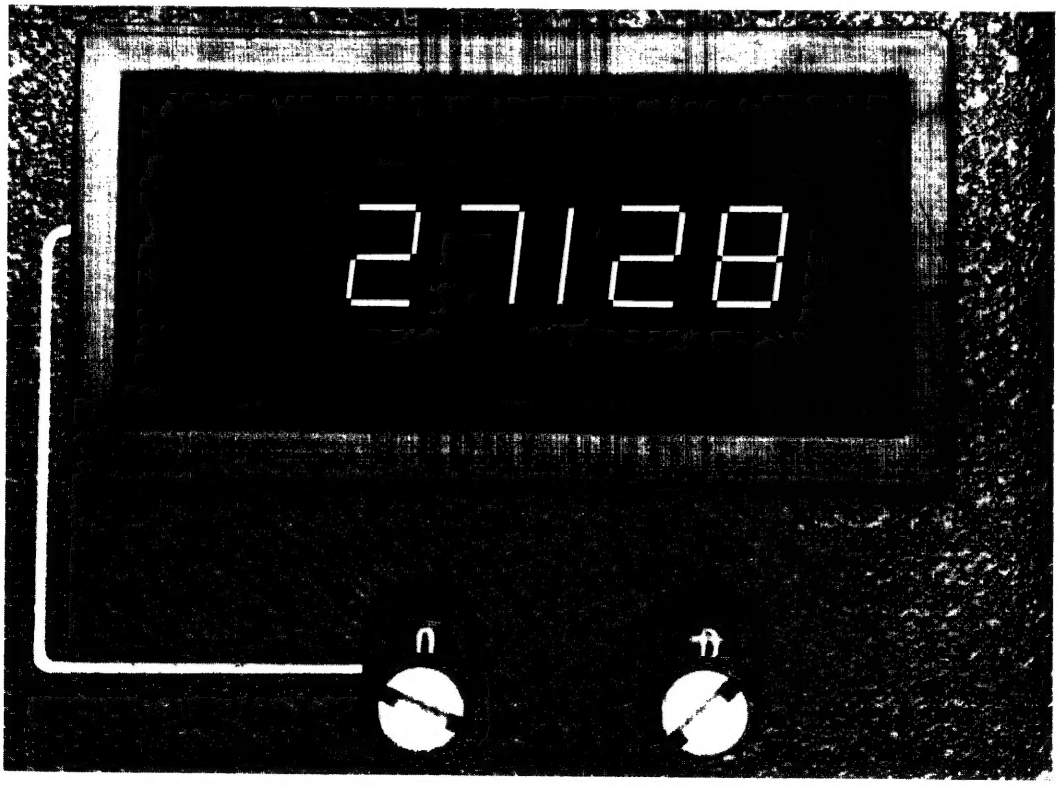
**DEVICE SELECT Switches**: These two hexidecimal coded, rotary switches are used to configure the PM9080 to program a particular device. A small flat-head screwdriver is required to change the switch positions.

**Alphanumeric Display**: This 8-digit alphanumeric display indicates the device type to be programmed. When the DEVICE SELECT switches are changed the display will change.

**OVERLOAD LED**: During any operation where they are used, the Vpp voltage supplied to the COPY socket and Vcc for the COPY and MASTER sockets are monitored for excessive current. If an overload should occur, the OVERLOAD indicator will illuminate and shut down Vpp. An overload condition on the M980 will be accompanied with an "E8" displayed and the FAIL tone will sound if enabled. On the M910A control unit the FAIL indicator will illuminate and the FAIL tone will sound.

## HOW TO CONFIGURE THE PM9080 FOR THE PROPER DEVICE

1. First find the device type under its Manufacturer's name using the DEVICE SELECTION GUIDE on page A-1. Note: For user convenience, device part numbers appear in numerical order starting with the device's first digit.
2. Find the two-digit hex number corresponding to that part. This will be located under the column named SWITCH POSITION.
3. Using a small flat-head screwdriver, select this number on the two hex rotary DEVICE SELECT switches located in the lower left-hand corner of the PM9080. When this number is selected, the device type will be displayed in the 8-digit alphanumeric displays above these hex rotary switches. Note: If a new device type is selected immediately after performing a function, depress RESET.
4. Find the Pinout Adapter type for the device to be programmed. This will be located under the column named PINOUT ADAPTER. (NOTE: All 24-pin and 28-pin PROMs use the PA28-80 adapter).
5. Plug the appropriate Pinout Adapter into the PM9080. The PM9080 is now configured for that device type.




Device Select Switch and Display

# SECTION 3
# Operating Modes (M980)

## READ

In this mode, the contents of the device in the COPY socket is shown hexadecimally in the M980 display. (See Section 5 of the M980 USER'S MANUAL).

## COMPARE

In this mode, the data in the Master device (or in the M980 RAM Buffer) is compared to the data in the Copy device. When the device compares completely, the M980 will display "F." If the Copy device fails to compare properly, the M980 will display an error message. (See Section 5 and 6 of the M980 USER'S MANUAL).

## PROGRAM

In this mode, data is manually entered from the keyboard and programmed into the COPY socket. While data is being programmed, the BUSY LED will be on (see Section 5 of the M980 USER'S MANUAL).

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**NOTE**

**Do not insert or remove devices while the BUSY LED is illuminated**

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## DUPLICATE

In this mode, the contents of the Master device (or of the M980 RAM Buffer) are programmed into the Copy device. While data is being programmed, the BUSY LED will be illuminated[1]. Following the programming of each address, the data is read at the high and low Vcc limits and compared to the source. When the device passes, an "F" will be displayed by the M980. If any location in the COPY device fails to program, the M980 will show an error message. (See Section 5 and 6 of the M980 USER'S MANUAL.)

## AUTO

In this mode, the M980 will automatically sequence through the BLANK CHECK, DUPLICATE, and COMPARE modes. (See individual mode descriptions for Pass and Fail indications).

## CHECKSUM

In this mode, the binary sum of the data in all addresses is automatically calculated and shown in hexadecimal form in the M980 display (the least significant six digits). You may checksum the Master or Copy device. To insure proper insertion and operation of the Master device it is recommended that a CHECKSUM be performed on the Master device prior to performing the COMPARE or DUPLICATE modes. (See Section 5 of the M980 USER'S MANUAL.)

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**NOTE**

**The start/end address displayed on the M980 is always eight digits, regardless of the device size. Example: For a 2716 device (2Kx8), the start/end address is "000007FF."**

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## BLANK CHECK

In this mode, the device in the COPY or MASTER socket is checked to see that it is totally erased. If the Copy or Master device is not unprogrammed, the M980 will display an error message. You can blank check all or part of the device (See Section 5 of the M980 USER'S MANUAL).

## E²PROM ERASURE

Place the E²PROM to be totally erased into the COPY socket. Place the device select switches into the ERASE position for the Copy device. Use the standard keystrokes to program the erased state (usually FF hex) into the first location of the Copy device. Circuitry and software within the PM9080 will erase the **entire E²PROM.**

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[1] M980 Control Units built prior to April 1982 require a software update to work with the PM9080.

# SECTION 4
# Operating Modes (M910A)

## BLANK CHECK

In this mode, the Copy device is checked to see that it is blank (unprogrammed). When the Copy device is blank, the M910A will sound a PASS tone (constant soft tone) and the M910A PASS indicator will illuminate. If the Copy device is not totally blank, the M910A will sound the FAIL tone (alternating soft and shrill tones) and the M910A FAIL indicator will illuminate. To repeat the BLANK CHECK, press RUN.

## DUPLICATE

In this mode, the contents of the Master device are transferred to the Copy device. When entering the DUPLICATE mode, the PM9080 implements a test to check if there is a backward device (Master or Copy), and test for shorted lines (see Short Detection Test). If a short is detected, or if a device is put in any socket backwards, the FAIL indicator will be illuminated and the FAIL tone will sound. If all tests pass successfully, the duplication will continue. When data is being programmed, the BUSY indicator on the PM9080 will be illuminated. When all Copy device locations have programmed successfully, the M910A will sound a PASS tone and the PASS indicator will illuminate. If the Copy device fails to properly program the data at any address location, the M910A will sound a FAIL tone and the FAIL indicator will illuminate. **CAUTION**: Do not repeat the DUPLICATE mode on devices that contain data.

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**NOTE**

**Do not insert or remove devices while the BUSY indicator is illuminated**

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## COMPARE

In this mode, the contents of the Master device are compared to the Copy device. The operation will continue until the last address of the device is compared. When the Copy device compares successfully, the M910A will sound a PASS tone and the PASS indicator will illuminate. If the Copy device fails to compare at any address, the M910A will sound the FAIL tone and the FAIL indicator will illuminate. To repeat this mode, press RUN.

## AUTO

In this mode, the M910A will sequence through the BLANK CHECK, DUPLICATE, and COMPARE modes. When the BLANK CHECK is successful, the M910A will automatically proceed into the DUPLICATE mode. When the DUPLICATE mode is successful, the M910A will automatically sequence into the COMPARE mode. To repeat the AUTO mode, press RUN. If failure occurs during any mode the FAIL indicator will be illuminated, the FAIL tone will sound, and the indicator for the mode which failed will remain illuminated.

## E²PROM ERASURE

Place the E²PROM to be totally erased into the COPY socket. Place the device select switches into the ERASE position for the Copy device. Perform a duplication function.

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M910A Control units built prior to April 1982 require a software update to work with the PM9080.

# SECTION 5
# PM9080 Diagnostics

## LARGE FAILURE RATE DURING PROGRAMMING OF UV DEVICES

A large failure rate of UV devices may be caused by many things. The most common failure occurs because these devices being programmed were not thoroughly erased prior to programming. MOS devices are programmed by applying a charge to a cell, large enough to be recognized as a programmed bit. These devices are erased by exposing them to UV light which dissipates this charge. Because of this, a device that is partially erased may still have a residual charge left in the cell that is not detectable under best-case conditions. During programming, these partially erased cells may receive enough charge to be detected as a programmed bit. The PM9080 performs a High and Low Vcc Test (Vcc is raised to 5.20 volts, and the data is read and compared to the data that is to be programmed into that address. Vcc is then lowered to 4.80 volts and the same test is performed after each address is programmed). During this test these residual charges may be detected and the device will fail.

There is an easy test for this failure. First, take the failed UV devices and erase them for the recommended length of time. Second, try reprogramming these parts; if the problem has been partially erased devices, most, if not all, of these devices will pass. To see if these devices are coming from the manufacturer with partially erased locations, take a sample of 32 devices and program half of them without erasing. Take the other half and erase them for the recommended time. Program these UV devices. Compare your results.

# SECTION 6
# Remote Device Selection

## SELECTING THE REMOTE FUNCTION OF THE PM9080

Step #1 Install the appropriate pinout adapter for the device to be programmed.

Step #2 Using a small flat-head screwdriver, turn the DEVICE SELECT Switches to the 00 position.

## INTERFACING THE CONTROL UNIT

NOTE: **Do not plug in the M304 Adapter with power ON.**

Step #1 Plug the M304 Adapter into the control unit.

Step #2 Connect the remote unit (i.e., Terminal/Computer) to the M304. (See the RS232 Section in your control unit User's Manual for further information on this connection.)

Step #3 Turn the Control Unit Power ON. REMOTE is displayed on the PM9080 display.

Step #4 Select the appropriate RS232 format active to receive data. (See the RS232 Section in your control unit User's Manual for further information on selecting an RS232 format.)

## REMOTE SELECTION OF THE DEVICE TYPE TO BE PROGRAMMED (After manual or power on RESET of the control unit)[1]

Step #1 Download one byte of data to the control unit's first RAM location (Hex address 0000) using the format selected. This data will be the hex equivalent of the DEVICE SELECT Switch position for the device to be programmed (see Device Selection Guide). Example: To remotely configure the PM9080 to program 2764s, download the data 0B Hex to the control unit RAM location 0000 Hex.

Step #2 Using the control unit remote control commands (see the Remote Control Section of your control unit User's Manual for further details), program this byte only into the PM9080 by duplicating to the Copy (see Example). Note: This will not program this data into the device. This will only select the device type.

Step #3 The control unit will respond appropriately. The PM9080 is now configured for the device type represented by the 8-bit byte sent to the control unit and PM9080. "2764" is displayed on the PM9080.

## REMOTE RESET OF THE PM9080

The REMOTE RESET of the PM9080 is performed by reading two locations from the Master to the control unit RAM Buffer. This is accomplished by using the control unit remote control commands as follows.

Step #1 Using the remote control commands, read the Master location E000(H) into the control unit RAM Buffer. The command is QXDME000E000. The control unit will respond appropriately.

Step #2 Next, read the Master location 0000(H) into the control unit RAM Buffer. This command is QXDM00000000. The control unit will respond appropriately. The PM9080 is now reset. The PM9080 Device Select display will indicate REMOTE if the DEVICE SELECT Switches are in the 00 position. The remote unit may now use the remote device selection sequence described previously in this section. (See example.)

## EXAMPLE OF REMOTE RESET AND DEVICE SELECTION (Using INTEL Hex format)

Step #1 Power is OFF on the control unit.

Step #2 Place the PM9080 Device Select Switches in the 00 position.

Step #3 Install the M304 RS232 Adapter and connect the remote unit.

Step #4 Turn the control unit POWER ON. The PM9080 will display REMOTE.

Step #5 Select the RS232 format active using the instructions in the Control Unit's User's Manual. The control unit is now ready to accept remote commands.

Step #6 Using the control unit remote commands send QXDME000E000. The control unit will respond with "Y" "Bell" "CR" "LF" to acknowledge the completion of this command.

Step #7 Using the control unit remote commands send QXDM00000000. The control unit will respond with "Y" "Bell" "CR" "LF" to acknowledge the completion of this command. The PM9080 is now ready to accept the device type to be programmed.

Step #8 Using the selected format (e.g., INTEL), download the Device Selection number for the device to be programmed, into the control unit RAM Buffer location 0000.

:00000000XXCC Where XX=Device Select switch number.
Where CC=CHECKSUM

[1]If a device type is to be remotely selected and a different device has previously been selected, a **MANUAL** or **REMOTE RESET** must be performed to assure proper acceptance of the remote device selection.

**Step #9** Using the control unit remote commands, send QXDB00000000. The control unit will respond with "Y" "Bell" "CR" "LF" to acknowledge the completion of this command. The PM9080 will display the device type selected.

**Step #10** Place the device to be programmed into the COPY socket. Download to the control unit RAM Buffer, the data to be programmed into the device. Then, using the remote control commands, program this data into the selected device. To select another device type, repeat Steps 6 thru 9.

# SECTION 7
# PM9080 Field Assurance Confidence Test (M980)

## HOW TO SELECT THE FIELD ASSURANCE CONFIDENCE TEST (FACT).

To enter the PM9080 confidence test, first select the Device type using the two DEVICE SELECTION switches[1] on the PM9080. Next, select the self-test mode of the M980. Hold any key down while pressing and releasing the RESET key. (See Section 14 of the M980 USER'S MANUAL.) The M980 will display "0 0 0 0" (M980 self-test selected). Press key F to enter the PM9080 confidence-test (the M980 will display "F0").

Keys 0 through 9 select the PM9080 confidence tests. (Do not press RESET between tests or you will exit the entire confidence test.) By pressing one of these keys and then ENTER, the test is executed. Keys A through F and Key 6 will result in an "E0" error (invalid test). To repeat any test, press ENTER.

### Vpp Test[1]

Connect the DVM ground (-) lead to pin 14 for a 28-pin COPY socket or pin 20 for a 40-pin socket. See Fig.7-1 for pin assignments and voltages.

**Key 0.** Press Key 0 and ENTER. This will set Vpp to less than 0.6V. The M980 will display "F0 F."

**Key 1.** Press 1 and ENTER. This will set Vpp to its low voltage value (see Figure 7-1). The M980 will display "F1 AAA." Press CLEAR to exit this test. The M980 will display "F1 F."

**Key 2.** Press 2 and ENTER. The M980 will display "F2 AAA." This will set Vpp to its high voltage value. (Note: The BUSY indicator is illuminated). Press CLEAR To exit this test. The M980 will display "F2 F."

### Vcc Test[1,2]

Vcc is pin 26 for 24-pin devices and pin 28 for 28-pin devices when using the PA28-80. Vcc is pin 40 when using the PA40-80/81/82.

**Key 3 (Vcc High).** Press key 3 and ENTER. This will set Vcc to 5.20±0.05V. The M980 will display "F3 AAA." Press CLEAR to exit test. The M980 will display "F3 F."

**Key 4 (Vcc Nominal).** Press key 4 and ENTER. This will set Vcc to 5.00±0.05V. The M980 will display "F4 AAA." Press CLEAR to exit test. The M980 will display "F4 F."

**Key 5 (Vcc Low).** Press key 5 and ENTER. This will set Vcc to 4.80±0.05V. The M980 will display "F5 AAA." Press CLEAR to exit test. The M980 will display "F5 F."

| DEVICE TYPE | Vpp PIN | Vpp LOW | Vpp HIGH |
|---|---|---|---|
| 2508/16 | 23 | 5.00±0.6V | 25±1V |
| 2532 | 23 | 5.00±0.6V | 25±1V |
| 2564 | 1 | 5.00±0.5V | 25±1V |
| 2716/58 | 23 | 5.00±0.6V | 25±1V |
| 2732 | 22 | TTL "0" | 25±1V |
| 2732A | 22 | TTL "0" | 21±0.5V |
| 2764 | 1 | 5.00±0.25V | 21±0.5V |
| MK2764 | 22 | TTL "0" | 25±0.5V |
| 27128 | 1 | 5.00±0.25V | 21±0.5V |
| 2808/2816 | 23 | 5.00±1V | 21±1V |
| 2817 | 1 | N/A | 21±1V |
| 3004/08,3704/08 | 26 | 5.00±1V | 16±1V |
| 48016 | 23 | 5.00±0.5V | 25±1V |
| 68764/766 | 22 | TTL "1" | 25±1V |
| 8741A | 26 | 5.00±0.25V | 25±1.5V |
| 8748 | 26 | 5.00±0.25V | 25±1.5V |
| 8748H | 26 | 5.00±0.25V | 21±0.5V |
| 8749H | 26 | 5.00±0.25V | 21±0.5V |
| 8751 | 31 | 5.00±0.6V | 21±0.5V |
| 8755A | 1 | 5.00±0.6V | 25±1V |

Note: For 24 and 28-pin devices all pin references are made to a 28-pin socket.

Figure 7-1. Vpp Test Pin Assignments and Voltages

[1] For those devices having two positions (i.e., PROGRAM and ERASE), select the PROGRAM position. The ERASE position need only be used with the dynamic test.

[2] For 24 and 28-pin devices all pin references are made to a 28-pin socket.

## Address Line Test

**Key 9.** Press key 9 and ENTER. The M980 will display "F9 AAA." The address lines (see Figure 7-2) will toggle from TTL "0" to a TTL "1" level. Check with an oscilloscope set to 50us/div. Press CLEAR to exit this test. The M980 will display "F9 F."

| Pinout Adapter | | |
|---|---|---|
| **PA28-80** | **A0** Pin 10 (All devices) | **A8** Pin 25 (All devices) |
| | **A1** Pin 9 (All devices) | **A9** Pin 24 (All devices)[1] |
| | **A2** Pin 8 (All devices) | **A10** Pin 21 (2K and larger devices) |
| | **A3** Pin 7 (All devices) | **A11** Pin 20 (2532/64,68764/66) |
| | **A4** Pin 6 (All devices) | Pin 23 (2732/64) |
| | **A5** Pin 5 (All devices) | **A12** Pin 23 (2564,68764/66) |
| | **A6** Pin 4 (All devices) | Pin 2 (2764) |
| | **A7** Pin 3 (All devices) | |
| **PA40-80/82** | **A0** Pin 12 (All devices) | **A6** Pin 18 (All devices) |
| | **A1** Pin 13 (All devices) | **A7** Pin 19 (All devices) |
| | **A2** Pin 14 (All devices) | **A8** Pin 21 (All devices) |
| | **A3** Pin 15 (All devices) | **A9** Pin 22 (All devices) |
| | **A4** Pin 16 (All devices) | **A10** Pin 23 (All devices) |
| | **A5** Pin 17 (All devices) | **A11** Pin 24 (2K devices) |
| **PA40-81** | **A0** Pin 39 | **A6** Pin 33 |
| | **A1** Pin 38 | **A7** Pin 32 |
| | **A2** Pin 37 | **A8** Pin 21 |
| | **A3** Pin 36 | **A9** Pin 22 |
| | **A4** Pin 35 | **A10** Pin 23 |
| | **A5** Pin 34 | **A11** Pin 24 |
| | | **A12** Pin 25 |

Figure 7-2. Pin Assignments for Address Lines

## Dynamic Test

**Key 7.** Press key 7 and ENTER. The M980 will display "F7 AAA," and the BUSY indicator on the PM9080 will be illuminated. This test puts the PM9080 into a continuous programming cycle. Check the appropriate pins for the programming waveforms below. The device selected by the hex switches will determine which of the waveforms in Figures 7-3 thru 7-6 will be generated.

## Short Detection Test[2]

**Key 8.** Press key 8 and ENTER. The M980 will display "F8 AAA." This test checks for shorts on Vcc, Vpp, address and data lines. If there are any shorts, "F8 E8" will be displayed for error. The OVERLOAD LED will illuminate if the short is on Vcc or Vpp. To repeat this test after an error is found, press ENTER. Press CLEAR to exit this test. The M980 will display "F8 F."

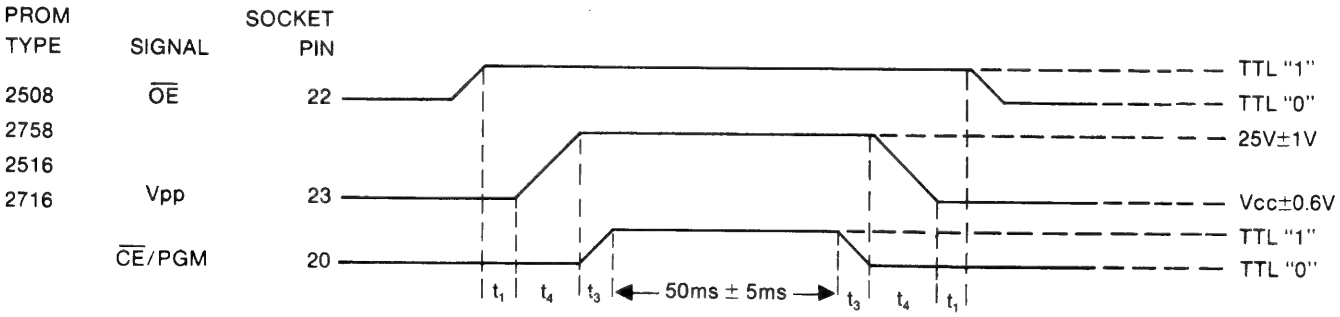



Figure 7-3. Programming Waveforms for Dynamic Test

[1] Address line A9 will toggle from TTL "0" to a $V_{IH}$ level of 11.75V±.25V.

[2] Data lines cannot be tested for shorts on the PA40-80, 81, or 82.

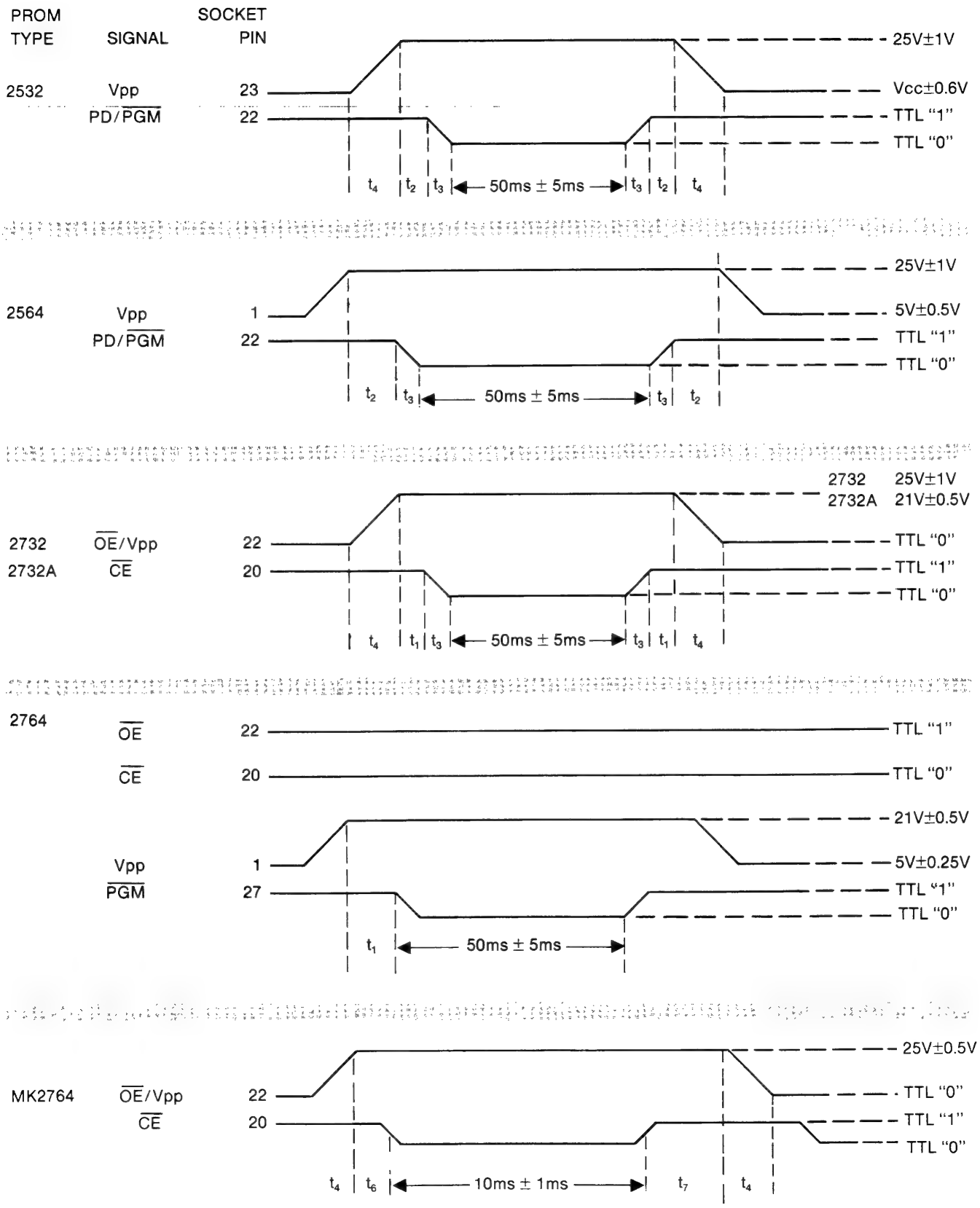



Figure 7-4. Programming Waveforms for Dynamic Test

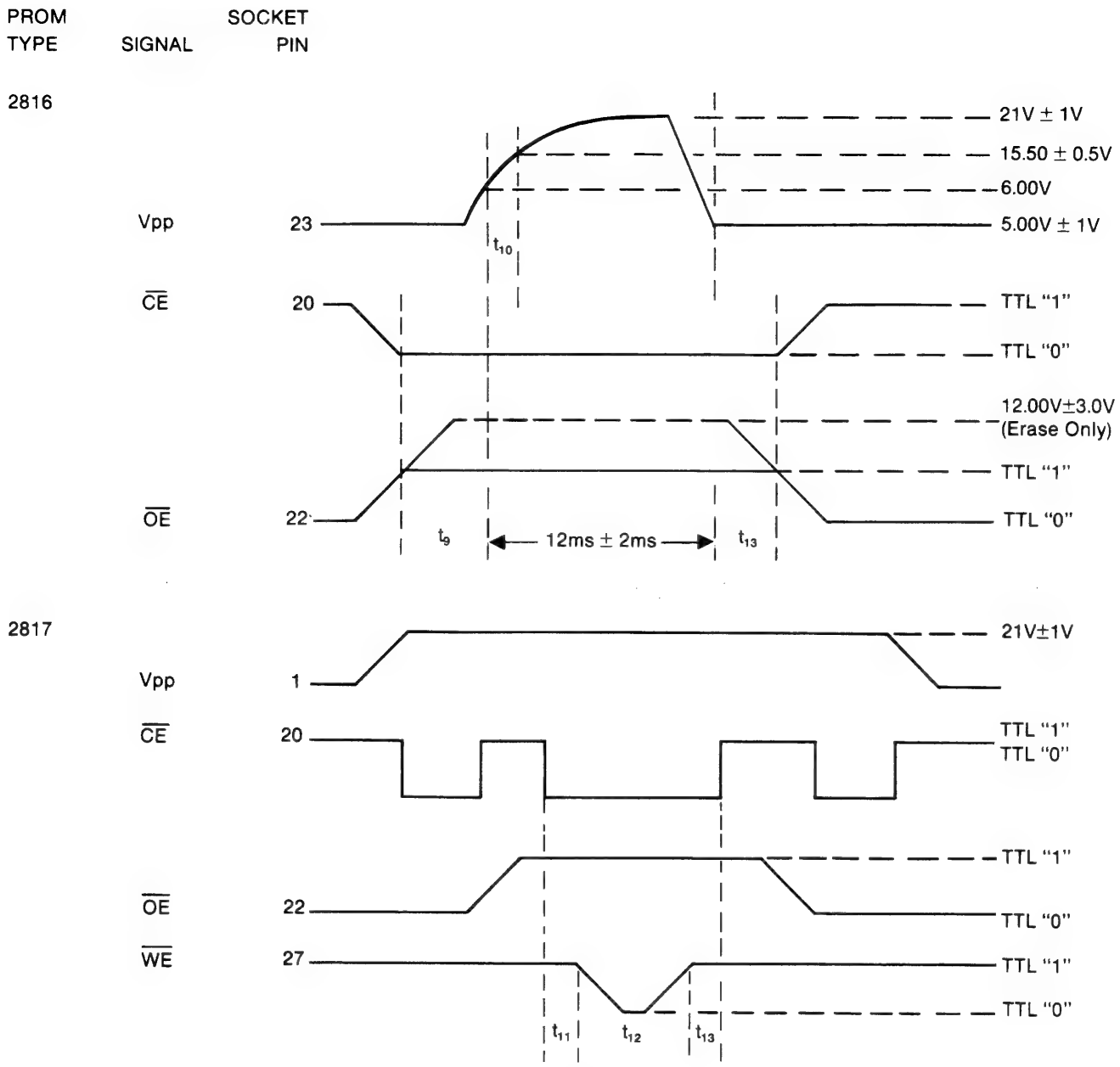



Figure 7-5. Programming Waveforms for Dynamic Test

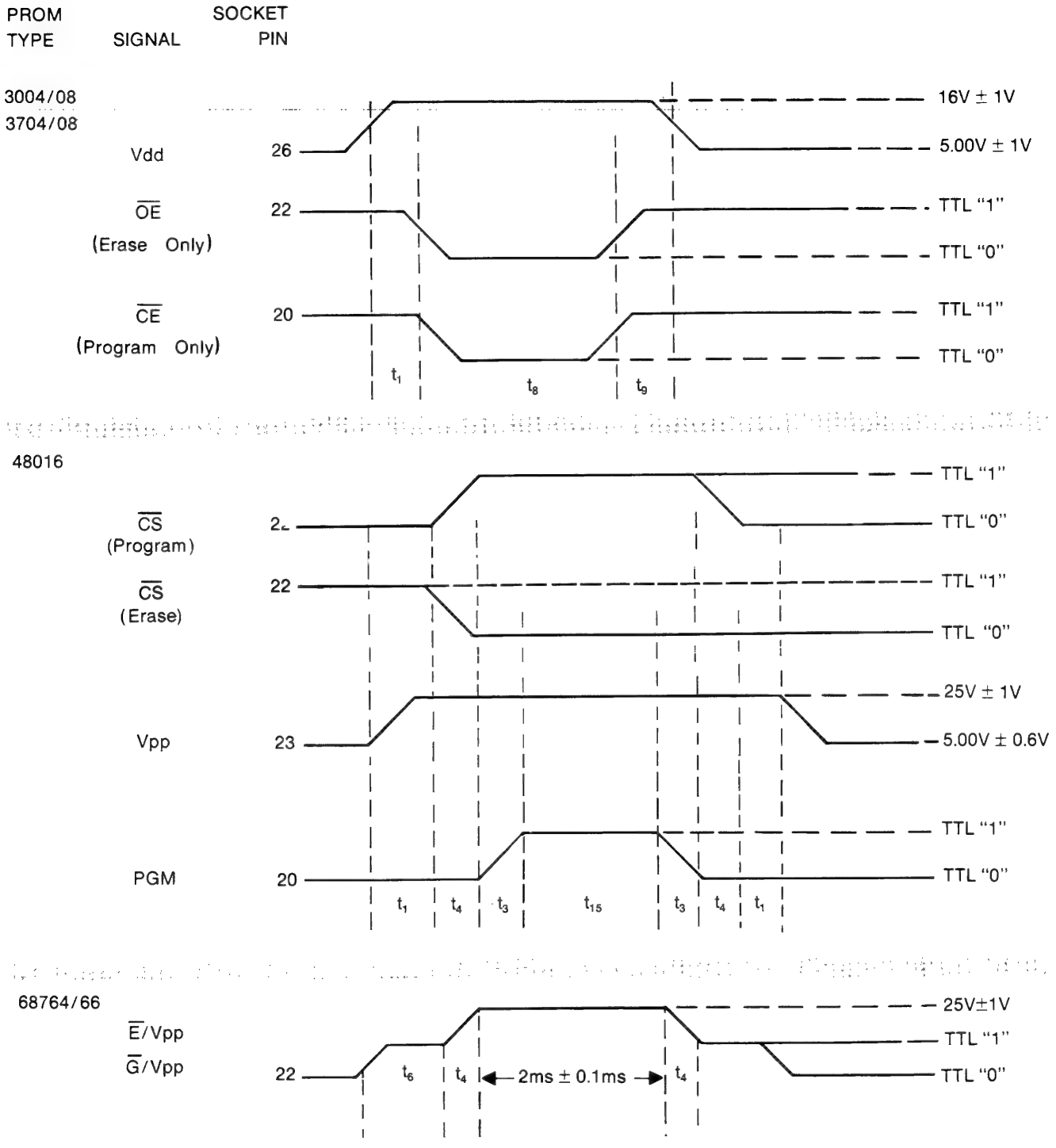



Figure 7-6. Programming Waveforms for Dynamic Test

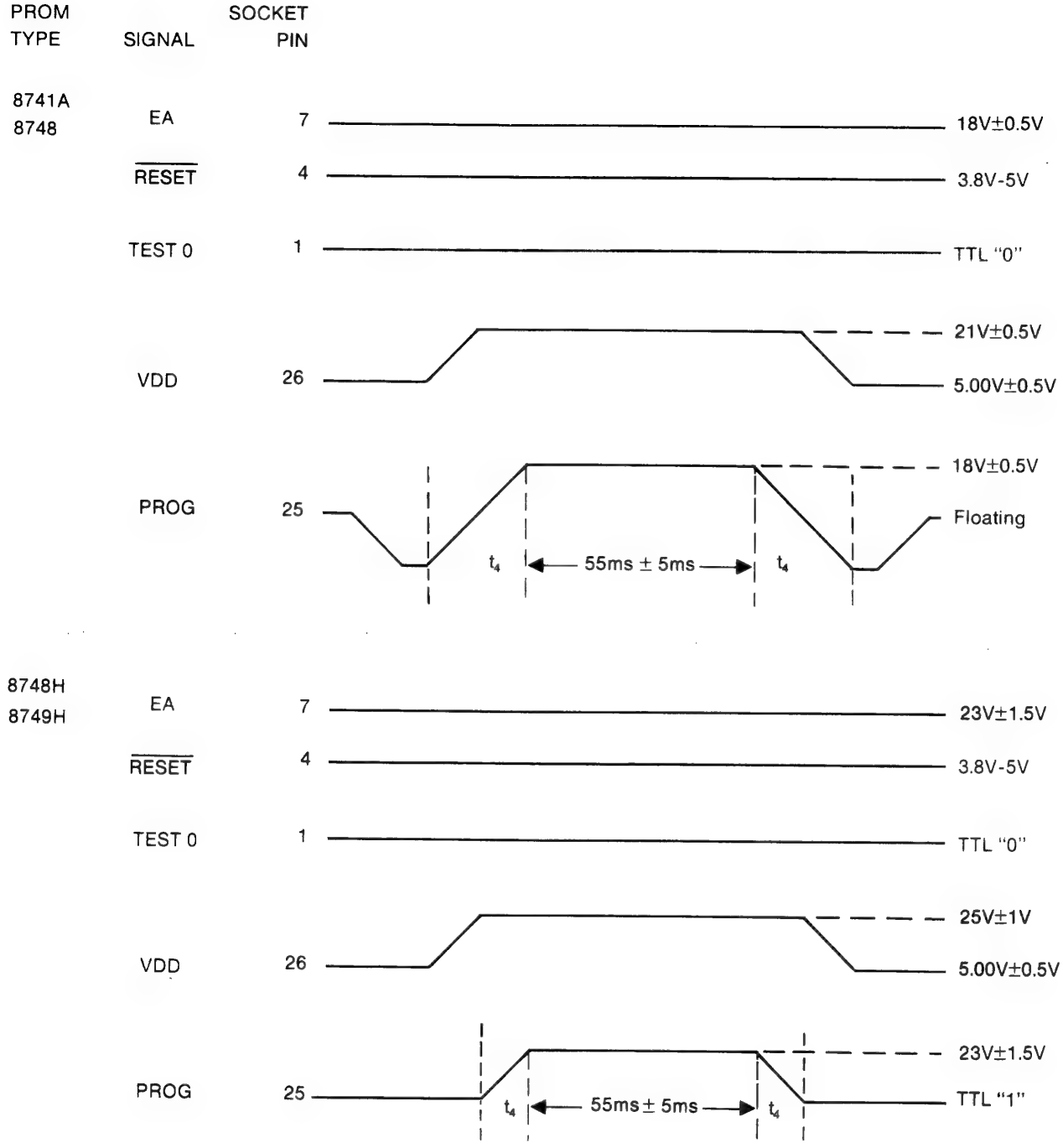



Figure 7-7. Programming Waveforms for Dynamic Test

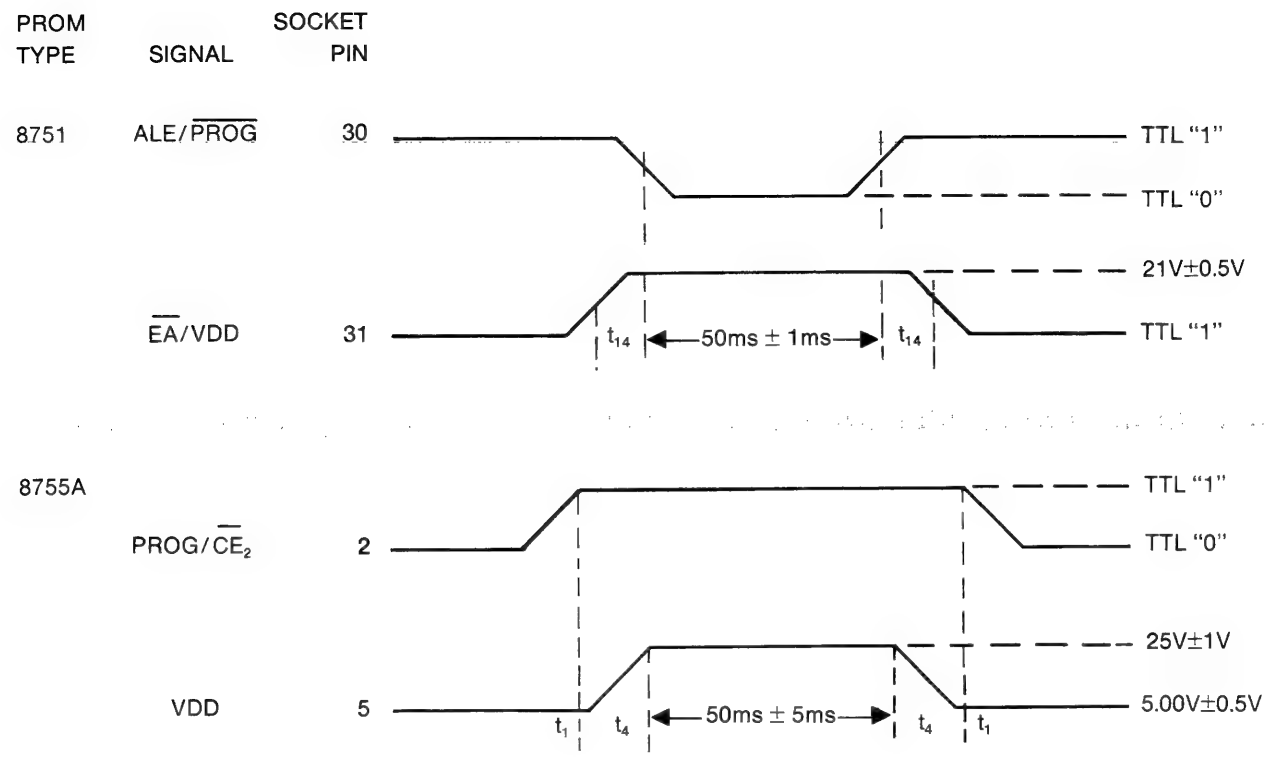



Figure 7-8. Programming Waveforms for Dynamic Test

**TIMING NOTES FOR FIGURES 7-3 to 7-8**

| | | |
|---|---|---|
| $t_1$=2$\mu$s minimum* | $t_2$=0ns minimum* | $t_3$=5ns minimum* |
| $t_4$=$T_R$ & $T_F$=0.5$\mu$s-2$\mu$s | $t_6$=4$\mu$s minimum* | $t_7$=1ms minimum* |
| $t_8$=0.5ms-10ms | $t_9$=200ns minimum* | $t_{10}$=600$\mu$s |
| $t_{11}$=20ns minimum* | $t_{12}$=100ns minimum* | $t_{13}$=50ns minimum* |
| $t_{14}$=10$\mu$s minimum* | $t_{15}$=20ms minimum (Program) | or 200ms minimum (Erase) |
| TTL "1"=+2.4V minimum | TTL "0"=+0.4V maximum | |

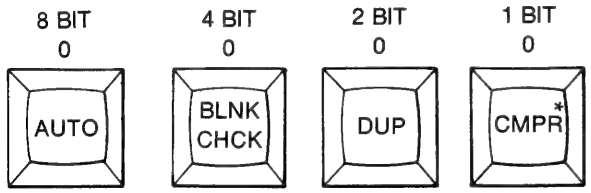
*Minimum times are given. Typical times are much greater and are not critical for a proper programming sequence.

# SECTION 8
# PM9080 Field Assurance Confidence Test (M910A)

## HOW TO SELECT THE FIELD ASSURANCE CONFIDENCE TEST (FACT).

To select the PM9080 confidence test with the M910A, first select the device type to be tested by using the two DEVICE SELECTION switches[1] on the PM9080. Then, while holding the RUN key down, depress and release the RESET key. The PASS, FAIL, and RUN indicators on the M910A will illuminate to indicate that the unit is in the PM9080 confidence test.

The four indicators above the mode keys on the M910A will indicate a binary pattern to show which of the PM9080 confidence tests is selected (test 1 through test A). To exit from the confidence-test mode, press RESET.




*On earlier models of the M910A this key says "VER."

### Vpp Test[1]

Connect the DVM ground (-) lead to pin 14 for a 28-pin COPY socket or pin 20 for a 40-pin COPY socket. See Fig. 8-1 for pin assignments and voltages.

**Test 1.** Press CMPR (binary "1" shown in indicators). This will set Vpp to its low voltage value.

**Test 2.** Press RUN (binary "2" shown in indicators). This will set Vpp to its high voltage value. Note that the BUSY indicator on the PM9080 is illuminated.

**Test 3.** Press RUN (binary "3" shown in indicators). This will set Vpp to less than 0.6V.

### Vcc Test[1,2]

Vcc is pin 26 for 24-pin devices and pin 28 for 28-pin devices when using the PA28-8-. Vcc is pin 40 when using the PA40-80/81/82.

**Test 5. (Vcc High).** Press RUN (binary "5" shown in indicators). This will set Vcc to 5.20±0.05V.

**Test 6. (Vcc Nominal).** Press RUN (binary "6" shown in indicators). This will set Vcc to 5.00±0.05V.

**Test 7. (Vcc Low).** Press RUN (binary "7" shown in indicators). This will set Vcc to 4.80±0.05V.

| DEVICE TYPE | Vpp PIN | Vpp LOW | Vpp HIGH |
|---|---|---|---|
| **2508/16** | 23 | 5.00±0.6V | 25±1V |
| **2532** | 23 | 5.00±0.6V | 25±1V |
| **2564** | 1 | 5.00±0.5V | 25±1V |
| **2716/58** | 23 | 5.00±0.6V | 25±1V |
| **2732** | 22 | TTL "0" | 25±1V |
| **2732A** | 22 | TTL "0" | 21±0.5V |
| **2764** | 1 | 5.00±0.25V | 21±0.5V |
| **MK2764** | 22 | TTL "0" | 25±0.5V |
| **27128** | 1 | 5.00±0.25V | 21±0.5V |
| **2808/2816** | 23 | 5.00±1V | 21±1V |
| **2817** | 1 | N/A | 21±1V |
| **3004/08,3704/08** | 26 | 5.00±1V | 16±1V |
| **48016** | 23 | 5.00±0.5V | 25±1V |
| **68764/766** | 22 | TTL "1" | 25±1V |
| **8741A** | 26 | 5.00±0.25V | 25±1.5V |
| **8748** | 26 | 5.00±0.25V | 25±1.5V |
| **8748H** | 26 | 5.00±0.25V | 21±0.5V |
| **8749H** | 26 | 5.00±0.25V | 21±0.5V |
| **8751** | 31 | 5.00±0.6V | 21±0.5V |
| **8755A** | 1 | 5.00±0.6V | 25±1V |

Note: For 24 and 28-pin devices all pin references are made to a 28-pin socket.

Figure 8-1. Vpp Test Pin Assignments and Voltages

[1] For those devices having two positions (i.e., PROGRAM and ERASE), select the PROGRAM position. The ERASE position need only be used with the dynamic test.

[2] For 24 and 28-pin devices all pin references are made to a 28-pin socket.

## Address Line Test

**Test A.** Press AUTO (binary "A" shown in indicators). The address lines (see Figure 8-2) will toggle from TTL "O" to a TTL "1" level[1]. Check with an oscilloscope set to 50us/div. To exit from the address test, press RUN.

| Pinout Adapter | | |
|---|---|---|
| **PA28-80** | **A0** Pin 10 (All devices) | **A8** Pin 25 (All devices) |
| | **A1** Pin 9 (All devices) | **A9** Pin 24 (All devices)[1] |
| | **A2** Pin 8 (All devices) | **A10** Pin 21 (2K and larger devices) |
| | **A3** Pin 7 (All devices) | **A11** Pin 20 (2532/64,68764/66) |
| | **A4** Pin 6 (All devices) | Pin 23 (2732/64) |
| | **A5** Pin 5 (All devices) | **A12** Pin 23 (2564,68764/66) |
| | **A6** Pin 4 (All devices) | Pin 2 (2764) |
| | **A7** Pin 3 (All devices) | |
| **PA40-80/82** | **A0** Pin 12 (All devices) | **A6** Pin 18 (All devices) |
| | **A1** Pin 13 (All devices) | **A7** Pin 19 (All devices) |
| | **A2** Pin 14 (All devices) | **A8** Pin 21 (All devices) |
| | **A3** Pin 15 (All devices) | **A9** Pin 22 (All devices) |
| | **A4** Pin 16 (All devices) | **A10** Pin 23 (All devices) |
| | **A5** Pin 17 (All devices) | **A11** Pin 24 (2K devices) |
| **PA40-81** | **A0** Pin 39 | **A6** Pin 33 |
| | **A1** Pin 38 | **A7** Pin 32 |
| | **A2** Pin 37 | **A8** Pin 21 |
| | **A3** Pin 36 | **A9** Pin 22 |
| | **A4** Pin 35 | **A10** Pin 23 |
| | **A5** Pin 34 | **A11** Pin 24 |
| | | **A12** Pin 25 |

Figure 8-2. Pin Assignments for Address Lines

## Dynamic Test

**Test 8.** Press DUP (binary "8" shown in indicators). The BUSY indicator on the PM9080 will be illuminated. This test puts the PM9080 into a continuous programming cycle. Check the appropriate pins for the programming waveforms below. The device selected by the hex switches will determine which of the waveforms in Figures 8-3 thru 8-6 will be generated.

## Short Detection Test[2]

**Test 9.** Press BLNK CHK (binary "9" shown in indicators). This test checks for shorts on Vcc, Vpp, and address lines. If a short is detected, the M910A will sound the FAIL tone and the PASS light will go off. When the short is removed, press RUN to continue the test. To exit preliminary test, press RUN and hold it down for approximately one second.

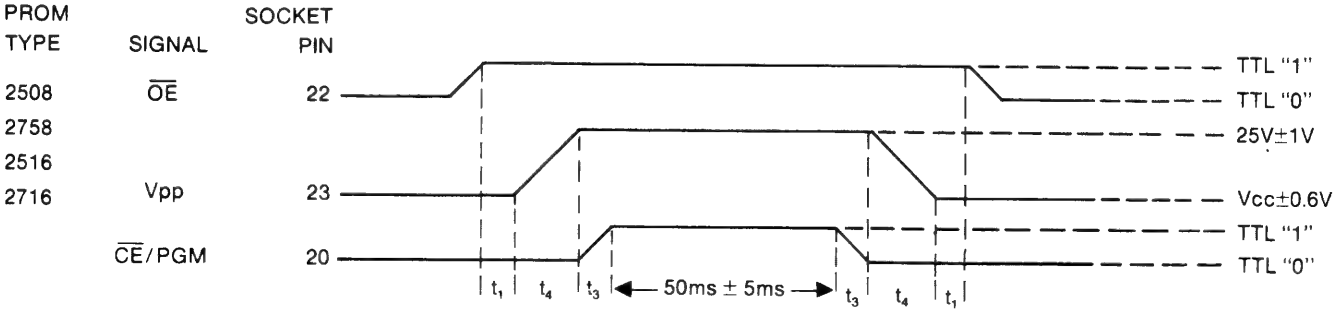



Figure 8-3. Programming Waveforms for Dynamic Test

[1] Address line A9 will toggle from TTL "0" to a $V_{IH}$ level of 11.75V±.25V.

[2] Data lines cannot be tested for shorts on the PA40-80, 81, or 82.

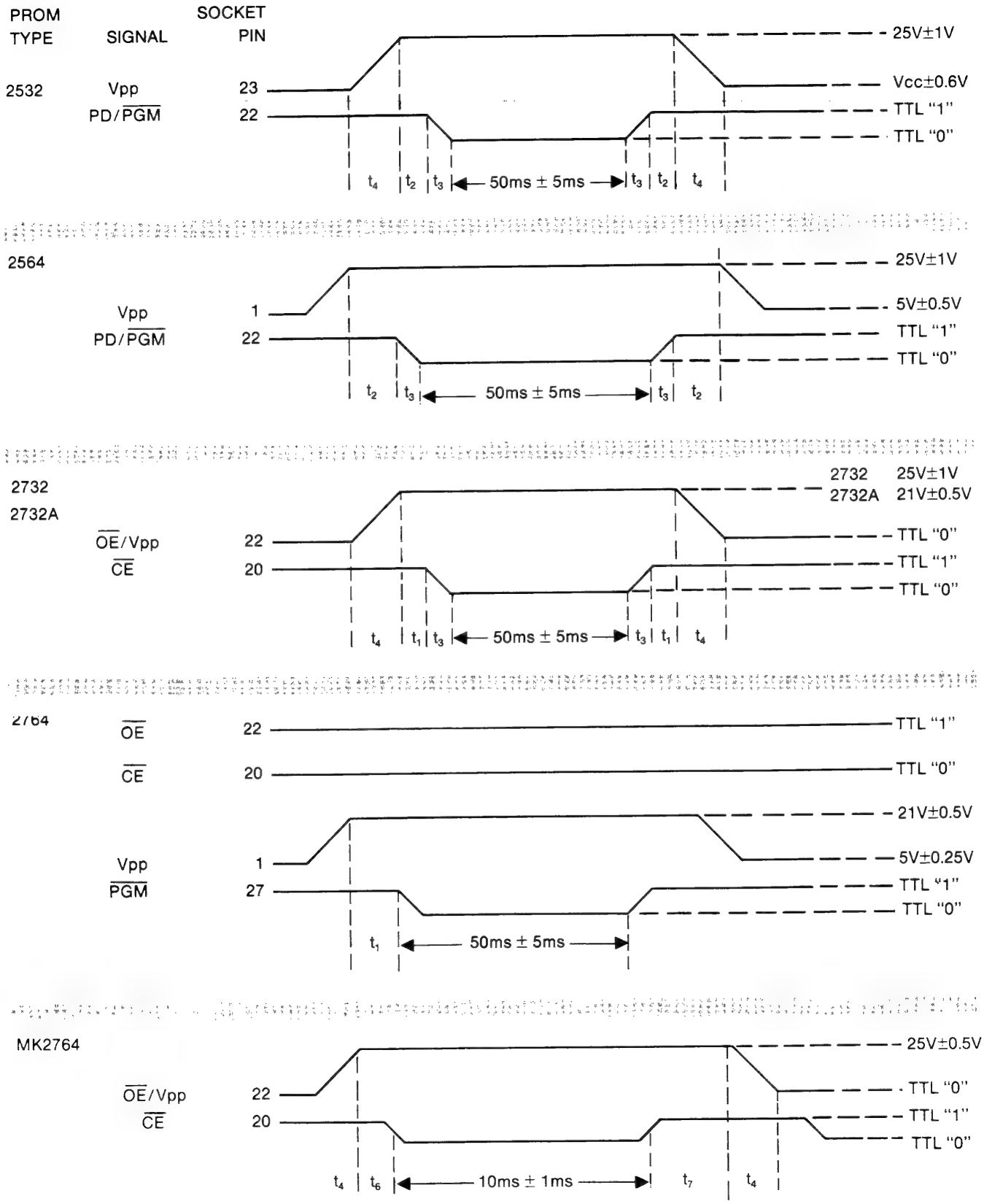



Figure 8-4. Programming Waveforms for Dynamic Test

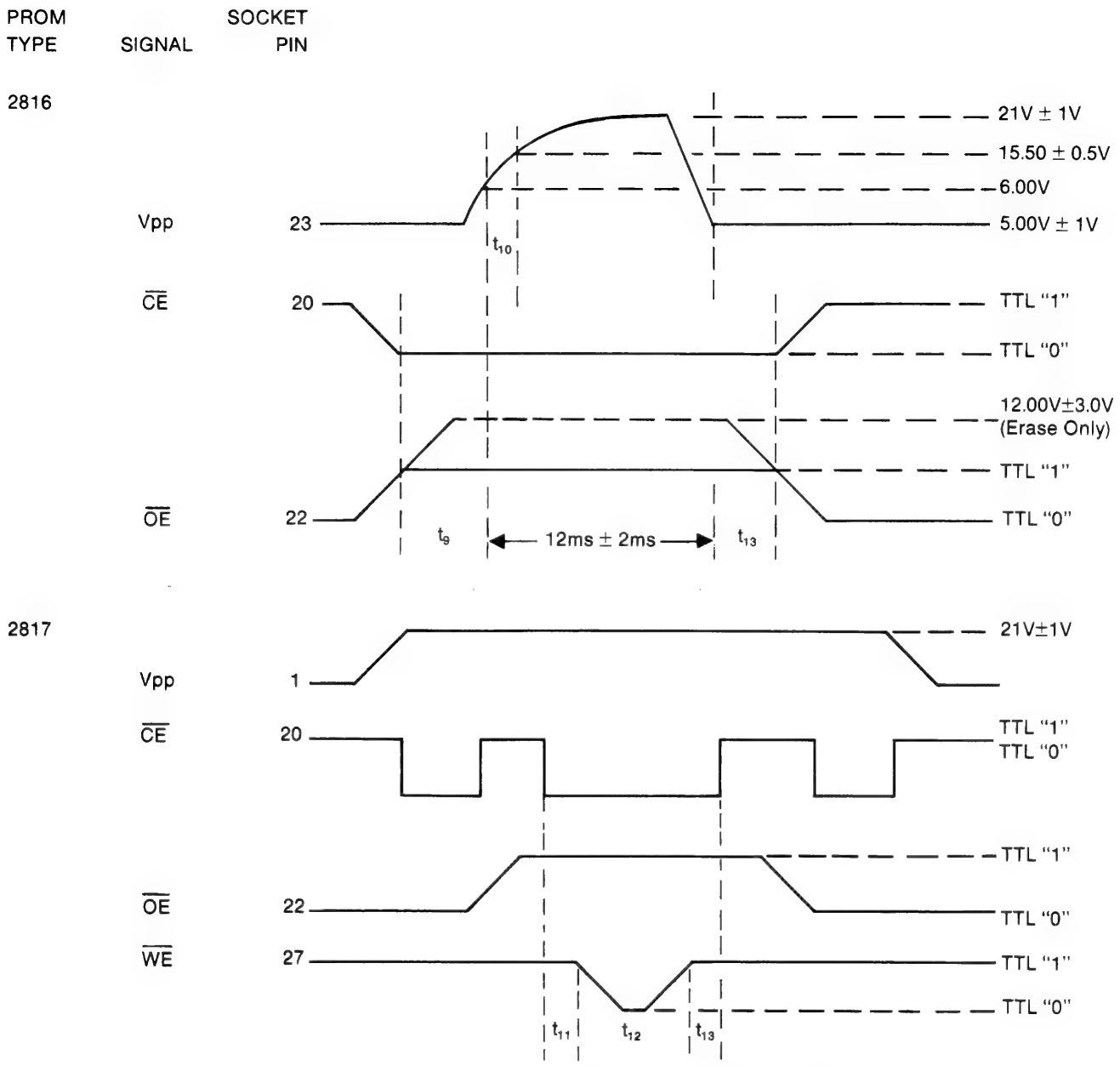



Figure 8-5. Programming Waveforms for Dynamic Test

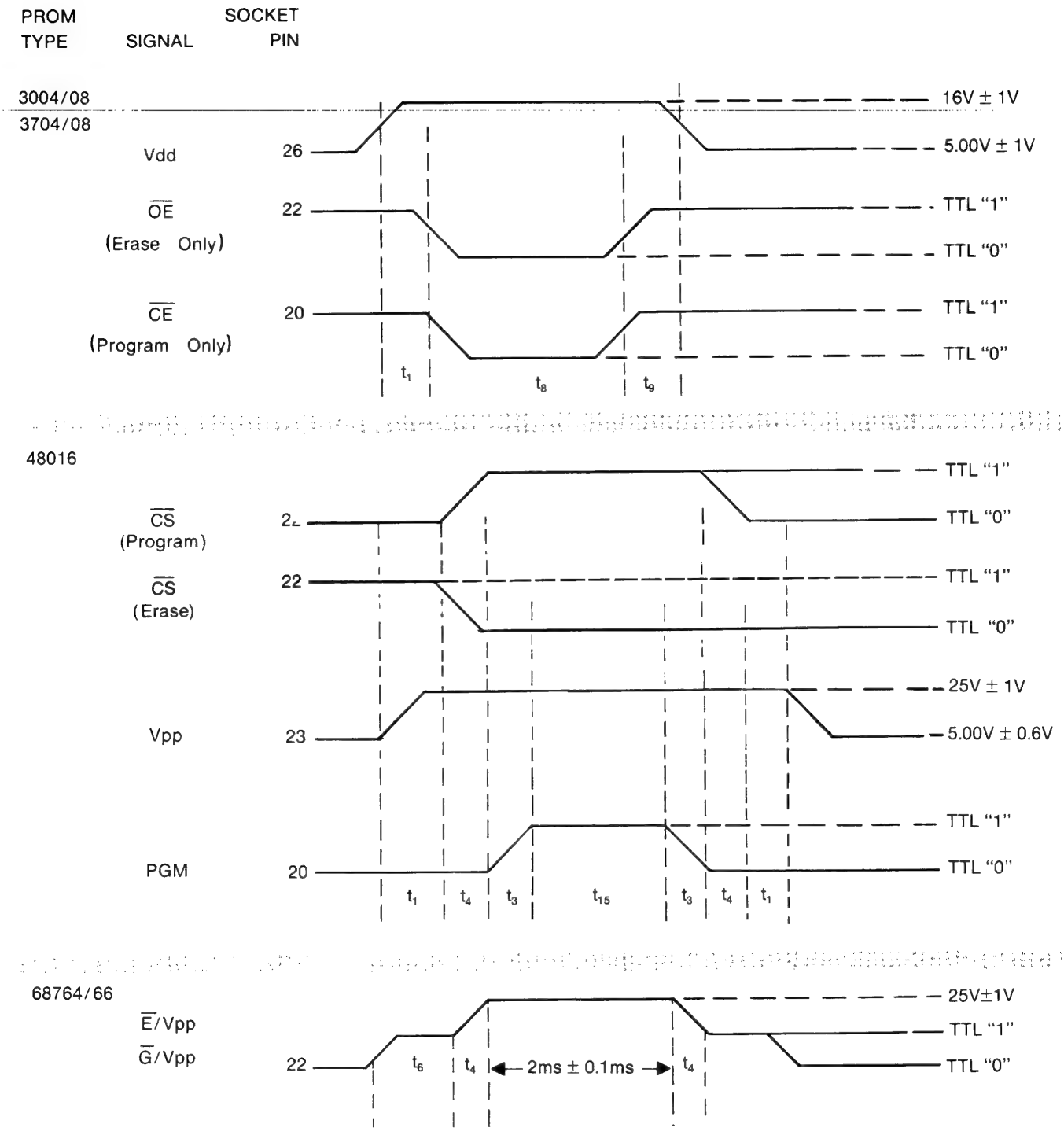



Figure 8-6. Programming Waveforms for Dynamic Test

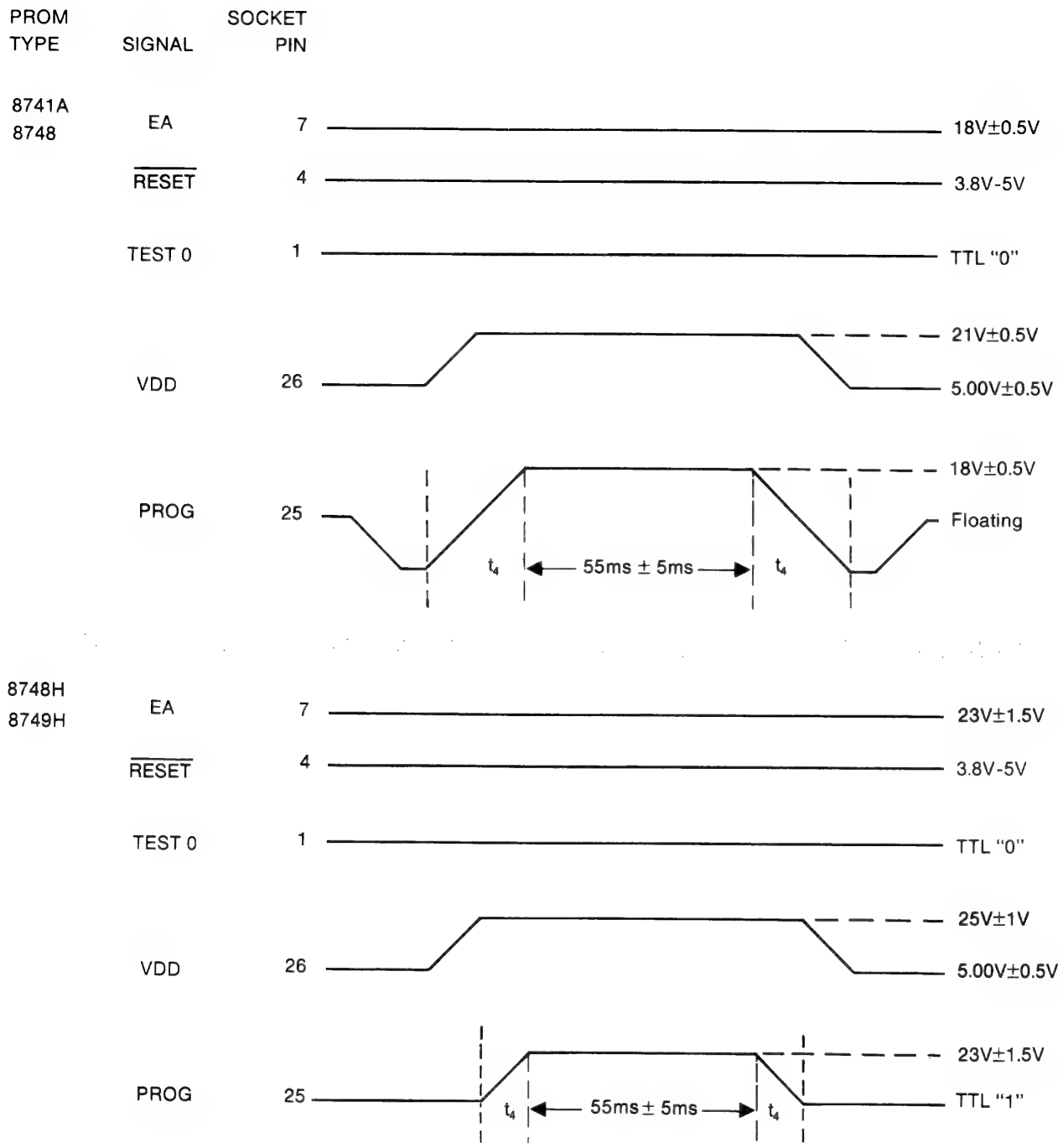



Figure 8-7. Programming Waveforms for Dynamic Test

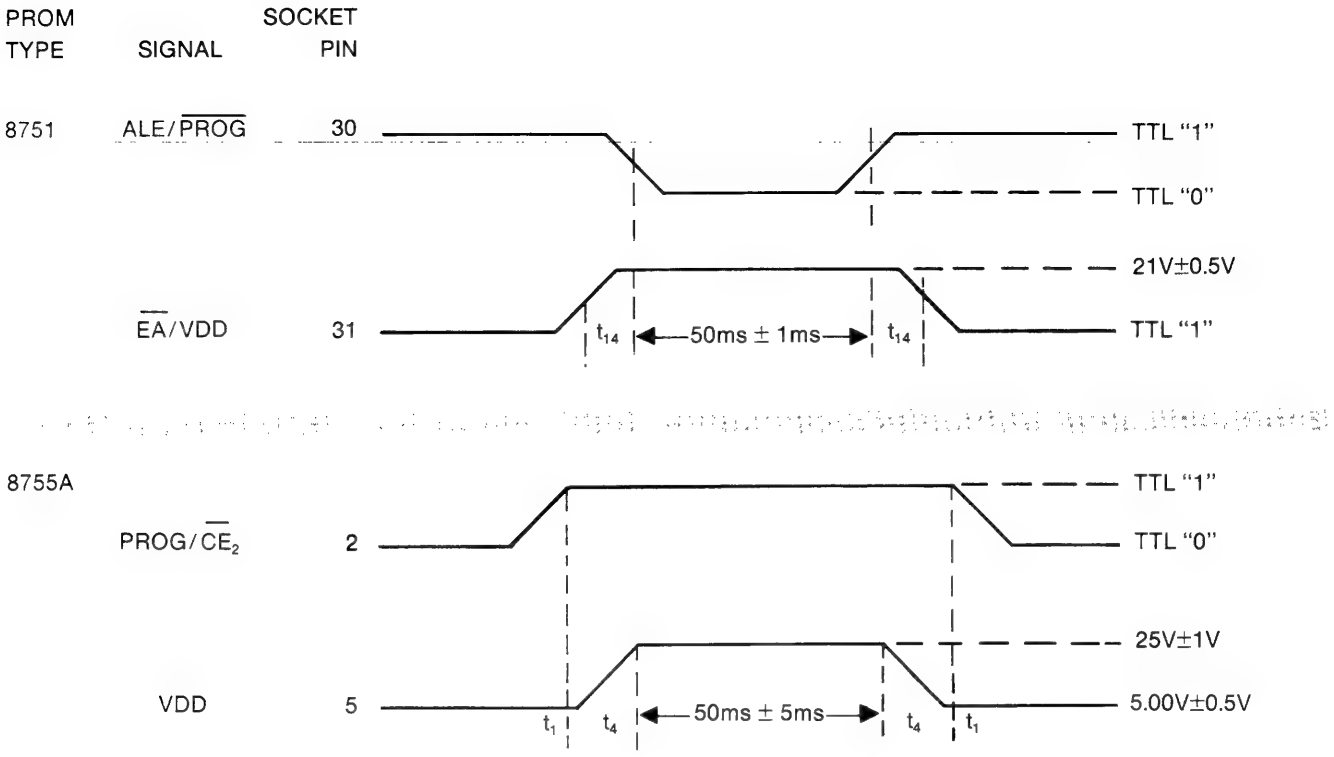



Figure 8-8. Programming Waveforms for Dynamic Test

**TIMING NOTES FOR FIGURES 8-3 to 8-8**

| | | |
|---|---|---|
| $t_1$=2$\mu$s minimum* | $t_2$=0ns minimum* | $t_3$=5ns minimum* |
| $t_4$=$T_R$ & $T_F$=0.5$\mu$s-2$\mu$s | $t_6$=4$\mu$s minimum* | $t_7$=1ms minimum* |
| $t_8$=0.5ms-10ms | $t_9$=200ns minimum* | $t_{10}$=600$\mu$s |
| $t_{11}$=20ns minimum* | $t_{12}$=100ns minimum* | $t_{13}$=50ns minimum* |
| $t_{14}$=10$\mu$s minimum* | $t_{15}$=20ms minimum (Program) | or 200ms minimum (Erase) |
| TTL "1"=+2.4V minimum | TTL "0"=+0.4V maximum | |

*Minimum times are given. Typical times are much greater and are not critical for a proper programming sequence.

# APPENDIX A

## DEVICE SELECTION GUIDE

| MANUFACTURER | PART # | SWITCH POSITION | DISPLAY[1] | PINOUT ADAPTER |
|---|---|---|---|---|
| AMD | 2716/4716 | 07 | 2716 | 28-80 |
| | 2732/4732 | 08 | 2732 | 28-80 |
| | 2764[2] | 0B | 2764 | 28-80 |
| FAIRCHILD | 2532 | 03 | 2532 | 28-80 |
| | 2564[2] | 04 | 2764 | 28-80 |
| | 2716 | 07 | 2716 | 28-80 |
| | 2732 | 08 | 2732 | 28-80 |
| | 2764[2] | 0B | 2764 | 28-80 |
| FUJITSU | 8516(2716) | 07 | 2716 | 28-80 |
| | 8532(2732) | 08 | 2732 | 28-80 |
| | 2732A | 09 | 2732A | 28-80 |
| | 2764 | 0B | 2764 | 28-80 |
| HITACHI | 462532 | 03 | 2532 | 28-80 |
| | 462716 | 07 | 2716 | 28-80 |
| | 462732 | 08 | 2732 | 28-80 |
| | 48XXX(ERASE) | 2A | 48XXX/ERASE | 28-80 |
| | 48016(PROG) | 2B | 48016/PROGRAM | 28-80 |
| HUGHES | 30XX(ERASE) | 20 | 30XX/ERASE | 28-80 |
| | 3004(PROG) | 21 | 3004/PROGRAM | 28-80 |
| | 3008(PROG) | 22 | 3008/PROGRAM | 28-80 |
| | 37XX(ERASE) | 23 | 37XX/ERASE | 28-80 |
| | 3704(PROG) | 24 | 3704/PROGRAM | 28-80 |
| | 3708(PROG) | 25 | 3708/PROGRAM | 28-80 |
| INTEL | 2716 | 07 | 2716 | 28-80 |
| | 2732 | 08 | 2732 | 28-80 |
| | 2732A | 09 | 2732A | 28-80 |
| | 2758 | 0A | 2758 | 28-80 |
| | 2764 | 0B | 2764 | 28-80 |
| | 27128 | 0E | 27128 | 28-80 |
| | 28XX(ERASE) | 17 | 28XX/ERASE | 28-80 |
| | 2815(PROG) | 18 | 2815/PROGRAM | 28-80 |
| | 2816(PROG) | 19 | 2816/PROGRAM | 28-80 |
| | 2817[3] | 1A | 2817 | 28-80 |
| | 8741A | 40 | 8741A | 40-80 |
| | 8748 | 42 | 8748 | 40-80 |
| | 8748H | 43 | 8748H | 40-80 |
| | 8749H | 44 | 8749H | 40-80 |
| | 8751 | 45 | 8751 | 40-81 |
| | 8755A | 46 | 8755A | 40-82 |
| MARUMAN | 2716 | 07 | 2716 | 28-80 |

*Continued*

## DEVICE SELECTION GUIDE *(continued from page A-1)*

| MANUFACTURER | PART # | SWITCH POSITION | DISPLAY[1] | PINOUT ADAPTER |
|---|---|---|---|---|
| MITSUBISHI | 2716 | 07 | 2716 | 28-80 |
| | 2732 | 08 | 2732 | 28-80 |
| | 2764 | 0B | 2764 | 28-80 |
| MOSTEK | 2716 | 07 | 2716 | 28-80 |
| | MK2764 | 0D | MK2764 | 28-80 |
| MOTOROLA | 2532/L32 | 03 | 2532 | 28-80 |
| | 2716/L16 | 07 | 2716 | 28-80 |
| | 68764/L764 | 39 | 68764/ADAPTIVE | 28-80 |
| | 68766/ | 3A | 68766/ADAPTIVE | 28-80 |
| NATIONAL | 2532[2] | 03 | 2532 | 28-80 |
| | 2564[2] | 04 | 2564 | 28-80 |
| | 2716 | 07 | 2716 | 28-80 |
| | 2732/L32[2] | 08 | 2732 | 28-80 |
| | 2732A/L32A[2] | 09 | 2732A | 28-80 |
| | 2758Q-A | 0A | 2758 | 28-80 |
| | 2758Q-B[3] | 07 | 2716 | 28-80 |
| NEC | 2716 | 07 | 2716 | 28-80 |
| | 2732 | 08 | 2732 | 28-80 |
| | 8741A | 40 | 8741A | 40-80 |
| | 8748 | 42 | 8748 | 40-80 |
| OKI | 2532 | 03 | 2532 | 28-80 |
| | 2716 | 07 | 2716 | 28-80 |
| | 2732 | 08 | 2732 | 28-80 |
| | 2758 | 0A | 2758 | 28-80 |
| SYNERTEK | 2716 | 07 | 2716 | 28-80 |
| TI | TMS2508 | 01 | 2508 | 28-80 |
| | TMS2516 | 02 | 2516 | 28-80 |
| | 2532 | 03 | 2532 | 28-80 |
| | 2564 | 04 | 2564 | 28-80 |
| | TMS2732 | 08 | 2732 | 28-80 |
| | TMS2758-JLO | 0A | 2758 | 28-80 |
| | TMS2758-JL1[4] | 07 | 2716 | 28-80 |
| TOSHIBA | TMM323(2716) | 07 | 2716 | 28-80 |
| | 2732 | 08 | 2732 | 28-80 |
| | 8755A | 46 | 8755A | 40-82 |

[1] If two different messages are needed to identify the device to be programmed, then the display will alternate between messages every 1.5 seconds.

[2] Under development.

[3] The 2817 has built-in erasure. Do not use 28XX ERASE on the 2817 or damage will occur.

[4] These devices can only be programmed on the M980 control unit because the address field to program these devices must be redefined as 400 through 7FF (upper half of a 2716 EPROM).

## QUICK LOOK-UP TABLE FOR PM9080 DEVICE SELECT SWITCHES

| DEVICE TYPE | SWITCH POSITION | DEVICE TYPE | SWITCH POSITION |
|---|---|---|---|
| **REMOTE**[1] | 00 | **30XX (Erase)**[2] | 20 |
| | | **3004 (Program)** | 21 |
| **2508** | 01 | **3008 (Program)** | 22 |
| **2516** | 02 | | |
| **2532** | 03 | **37XX (Erase)**[2] | 23 |
| **2564** | 04 | **3704 (Program)** | 24 |
| | | **3708 (Program)** | 25 |
| **2716** | 07 | | |
| **2732** | 09 | **48XXX (Erase)**[2] | 2A |
| **2732A** | 09 | **48016 (Program)** | 2B |
| **2758** | 0A | | |
| **2764** | 0B | **68764 (ADAPTIVE)** | 3E |
| **2764 (ADAPTIVE)**[4] | 0C | **68766 (ADAPTIVE)** | 3F |
| **MK2764** | 0D | | |
| **27128** | 0E | **8741A** | 40 |
| **27128 (ADAPTIVE)**[4] | 0F | **8748** | 42 |
| | | **8748H** | 43 |
| **28XX (Erase)**[2] | 17 | **8749H** | 44 |
| **2815 (Program)** | 18 | **8751** | 45 |
| **2816 (Program)** | 19 | **8755A** | 46 |
| **2817** | 1A | | |
| | | **REMOTE UPDATE**[5] | 7F/FF[2] |
| **INVALID** | 7D[6] | | |
| **INVALID** | 7E[6] | | |

[1] When the Device Select Switches are placed in the 00 position, the word "REMOTE" will flash.

[2] This position will allow the erasure of the entire E²PROM family starting with the same number. Note: The 2817 cannot be erased using this position.

[3] ADAPTIVE should be used only on those devices indicated in the Device Selection Guide.

[4] Under development.

[5] These positions are used to remotely program onboard memory for adding or updating programming algorithms. Contact Pro-Log for further details.

[6] These positions are not valid device selection positions.

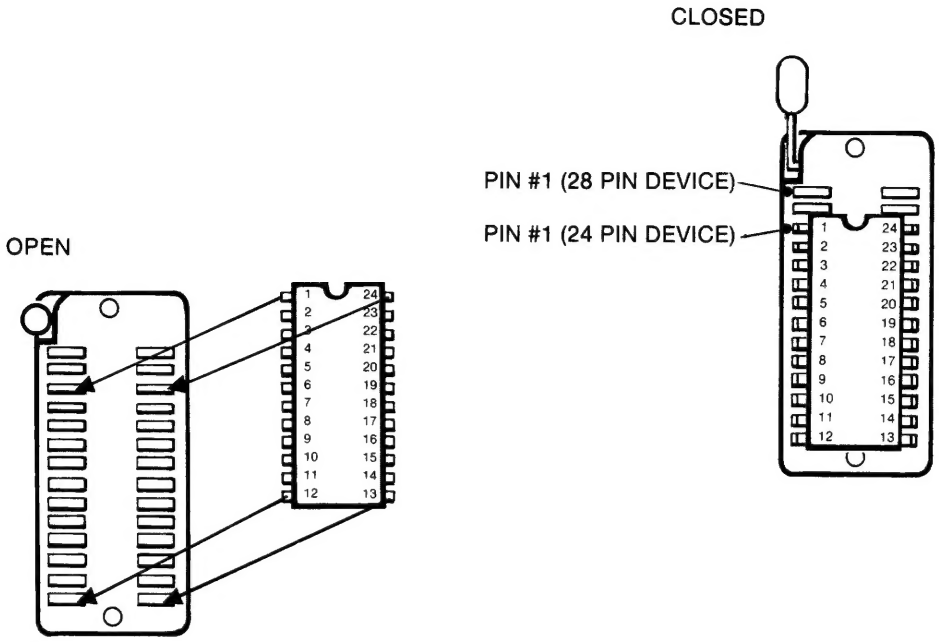



Figure A-1. 28-Pin ZIF Socket.

**MASTER/COPY Sockets**: All Pinout Adapters have one MASTER socket and one COPY socket. These sockets are activated by a handle, located adjacent to Pin 1 of the socket. When the handle is raised, or in the up position, the contacts are open and the device may be inserted. Lowering the handle engages the contacts and locks the device in place. The MASTER socket is a read-only socket to protect the master device from being accidentally programmed.

**PA28-80 PINOUT ADAPTER**: The PA28-80 plugs into the PM9080 using two reliable 25-pin D connectors. For user convenience, the PA28-80 pinout adapter incorporates a 28-pin Zero Insertion Force (ZIF) socket for both the MASTER and COPY sockets. All 24-pin and 28-pin EPROMs use the PA28-80 pinout adapter. Devices which have 24 pins are positioned with the device pin #1 in the socket pin #3. Thus the 24-pin device occupies the lower 24 pins of the 28-pin socket (see Figure A-1).

**PA40-80/81/82 PINOUT ADAPTERS**: These adapters plug into the PM9080 using two reliable 25-pin D connectors. For user convenience, the pinout adapters use a 40-pin Zero Insertion Force (ZIF) socket for both the MASTER and COPY sockets.

# PM9052A OPERATING INSTRUCTIONS

The PM9052A has been provided with two programming modes of operation — fixed and adaptive, selected by a switch on the module. Special post-programming address manipulation enables the module to program both Intel-compatibile 2716s and Motorola MCM 2716 EPROMs. For general features and operation refer to Pro-Log publication 104524: *Operating Instructions Series 90 Personality Module.*

## FIXED MODE

In this mode, the PM9052A programs in accordance with the Intel specification for their 2716, a single 50 millisecond pulse at each location to be programmed. All major manufacturers have tested and approved this method for long-term data storage.

## ADAPTIVE MODE

In this mode, shorter pulses (approximately 5 msec.) are applied to each cell programmed, until the cell begins to read as programmed, after N pulses. The programmer keeps track of how many pulses are required; then an additional 2N pulses are applied, to provide an overcharge for data retention. Pro-Log's tests and experience indicate that the overcharge created by this method is equivalent to that of the fixed method; however, PROM manufacturers have not tested the method and so do not give it their approval for long-term data retention.

The primary advantage of the adaptive programming technique is speed. Duplicating a 2716 with the fixed technique requires approximately 120 seconds, where the adaptive requires only 60 seconds for normal 2716 PROMs. For "stubborn" locations, should they occur, the amount of overcharge given by this algorithm should result in superior data retention, when compared to the fixed method. Thus, for prototype work, the adaptive technique is recommended. For production systems where the PROM manufacturer's guarantee is desired, the fixed method may be preferred.

102362B 5/80

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108662A 3K 6/82